

ECOLOGICAL STUDY OF *ASIATICOBDELLA BIRMANICA* IN LENDI AND GALATI STREAM NEAR PALAM DISTRICT PARBHANI, MAHARASHTRA INDIA

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ABSTRACT

Leeches are hermaphroditic annelids. Leech used in human treatment as bloodletting effective and useful creature, collected in unsustainable way which has reduced the population. The pollution of habitat was another effective reason behind the declining population. The most important environmental factors which determine the number and kinds of leeches in a given habitat Lendi and Galati stream near Palam are in approximate order of significance to maintain the population of Asiaticobdella Birmanica

KEYWORDS: Ecology, Habitat, Lendi and Galati Streams, Palam & Asiaticobdella Birmanica

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INTRODUCTION

Leech is one of the most ancient medicinal animals known to mankind. Moore (1927) initially suggested well defined scheme of classification of leech species distributed all over the world. Recently, revised taxonomic synopsis of leeches was proposed by Sawyer (1984). It is the recently accepted classification scheme of leech species all over the world. Only 680 different species of leeches described under 91 genera from fresh water including total 482 species; there are 102 species of marine leeches and 92 species reported from terrestrial habitat; there are reports of 60 species from freshwater from 17 genera from family Hirudinidae (Boris Sket and Peter Trontelj, 2008). Leeches are hermaphroditic annelids with totally reduced chetae and parapodia which are dominant in other classes of Phylum Annelida. The medicinal leech species *Hirudo medicinalis* was used in human treatment as bloodletting effective and useful creature and in this connection, this leech species was collected in non-sustainable way which has reduced the *H. medicinalis* population. The pollution of habitat was another effective reason behind the declining population in the Europe. To maintain the population of this leech species, it was imported to Europe (Siddal M.E. Burreson E.M., 1998). Several tons of medicinal leeches are used in Europe and Asia. It has been identified that, Turkey is the main country for the leech trade in the world today.

For study of typical habitat of *Asiaticobdella birmanica*, the most important environmental factors which determine the number and kinds of leeches in a given habitat are in approximate order of significance as like; Availability of food organisms, Nature of the substrate, Depth of water, Water currents (Lentic/Lotic), Size and nature of the water body, Hardness, pH and Temperature of the water, Minimum concentration of dissolved Oxygen, Siltation and turbidity, Water salinity.

The leech species *A. birmanica* found in various habitats in the study area is studied in the detailed aspect for habitat ecology. All the aspects are extremely important and deciding the distribution and population of *A. birmanica*. Various habitats studied for this leech species by taking in to consideration the aspects of ecology

such as, surrounding habitat, plain posture, farm land unimproved natural grassland vegetation like shading, submerged, floating, planktons, adjacent water body, physical factor, water quality, sediments base etc.

MATERIALS AND METHODS

The leeches were collected from the study area Palam taluka, district Parbhani, from two different habitats which are 3 kilometres away from each other, these are rivers streams and its surrounding areas, water bodies, stagnant water pools within the stream, isolated ponds, and reservoirs are studied in detail. Specially designed metal sieve net was used to collect the leeches. By splashing movements in water, the leeches were collected by entering in the water of habitat. The success of the catch was found maximum in the shallow coastal water of the habitat where the buffalo enter and sit in the water body. From the collected specimen after broad sort out of the catch on the basis of differences in the color pattern, body coloration with specific stripped color pattern on the dorsal, Black-bottle green interrupted longitudinal stripped pattern on the dirty yellowish green body coloration on the dorsal and ventral body surface with dark brown color; along the margin of the ventral plane surface, there is a dark yellow longitudinal band from anterior to posterior sucker, such specimen of all size were collected as roughly identified as *Asiaticobdella birmanica*. Final identification was done in the laboratory and confirmed as *Asiaticobdella birmanica* (Blanchard, 1894) after the reference of 'Classification, Ecology and Behaviour (Sawyer, 1984 & 1986).

Collected materials were relaxed in 15 % Ethanol and preserved in 70 % Ethanol. The figures were prepared as ink drawings and figures of internal anatomy and various systems were with the aid of Nikon Digital Camera (D-40 model, Japan). The specimens are deposited in the Reference Collection of the Department of Zoology, DSM's College of Arts, Commerce and Science, Parbhani, District, Maharashtra, India. The identification and confirmation of the leech species *A. birmanica* is based on the external morphological study and anatomical features of the internal organs of freshly collected specimen from the habitat. The data obtained from the various features of the species was used to compare with the standard literature of classification and ecology of Leeches (Sawyer, 1984 & 1986).

For the measurement of pH of water sample, the Pen-PH Meter (Digital) is used. The Conductivity is measured by Conductivity Meter. For the measurement of dissolved Oxygen, the Winkler's Method was used. Along with these parameters, the following common but important parameters like Temperature, Turbidity, Water color, in Signs of pollution, the Occurrence of Chironomous larvae and dipterans larvae, Algal blooms, foul smelling of water and silt, black color of water; these are some common factors denoting pollution of the water body were measured and noted (APHA 1985). The nature of pond base as sedimentary, silty or rocky or sandy type is noted.

In the random collection of the leeches from the study areas and other leech species found in the collection were *Poecilobdella granulose*, and *Poecilobdella manilensis*. The leech species selected for the study is *Asiaticobdella birmanica*. The world wide accepted scheme of classification of leeches as given below is most recently used in the study of leeches all over the world. The detail classification and general characters of the selected leech species *Asiaticobdella birmanica* are given as below.

**CLASSIFICATION OF *HIRUDO* (*ASIATICOBDELLA*) *BIRMANICA* (BLANCHARD, 1894),
(REVISED BY ANDERSON, 1973; SAWYER, 1984)**

Moore (1927) initially suggested well defined scheme of classification of leech species distributed all over the world. Recently, revised taxonomic synopsis of leeches was proposed by Anderson, 1973 and later on by Sawyer, 1984. It is the recently accepted scheme of classification of leech species all over the world.

Phylum – Uniramia (Anderson, 1973; Sawyer, 1984) (Earlier Annelida)

Class – Hirudinoidea (Soos, 1965-ICZN) (Earlier Hirudinea (Lamarck, 1818)

Order – Arhynchobdellida (Blanchard, 1894)

Sub-Order – Hirudiniformes (Caballero, 1952)

Family – Hirudidae (Whitman, 1886)

Sub-Family – Hirudinariinae (New sub-family) (Sawyer, 1986)

Genus – *Asiaticobdella* (Richardson, 1969) (Earlier – *Hirudo* Moore, 1927)

Species – *birmanica* (Blanchard, 1894)

Type species – *Asiaticobdella birmanica* (Blanchard, 1894), (Richardson, 1969), (Sawyer, 1984) (*Hirudo birmanica* Moore, 1927)

Asiaticobdella birmanica (Blanchard, 1894) is commonly named as 'Buffalo leech' (Sawyer, 1984; Chavan *et al.* 2010) because the leech species mostly prefer to be attached to Indian domestic Buffalo (*Bubals bubalus*) body for blood sucking as temporary ecto-parasite.

RESULTS AND DISCUSSIONS

The Surrounding habitat/land use like Narrow leaved woodland/Xerophytes are along the bank of Lendi and Galati Streams, leech species was found has marginal xerophytes growth of *Accassia vadiana* species of *Accassia*. The habitats studied for the occurrence of the leech species *A. birmanica*, there are the plain pastures, where the large population of domestic buffalo enters from nearby villages for grazing; therefore these two areas have large number of leech of this species. Near Farmland around every habitat of the leech species, there is farm land where the leech was found having the farm land. The crop cultivated in the farm were Jawar, Wheat, Pulses, sugarcane etc. seasonal Kharip and Rabbi Crops are regularly taken from the farm near by the different habitats. The unimproved natural grassland was found in many areas where the leech species was found. Such kind of grassland is found around the Palam along the road sides.

In the Vegetation of water body at many places, there was a shade producing vegetation of *Accasia* bush on the margin of a polluted stream and isolated ponds. The extent of submerged aquatic plants, The Hydrophytes or Aquatic plants found in a majority of habitats of the study area were *Hydrilla* sps., *Vallisnaria* sps., *Naja* sp., *Potamogeton* sp. Marginal weeds *Ipomea* species, *Typha* sp., *Cyperus* sp., *Colocasia* sp., *Phragmites* sp. The extents of floating leaved aquatic plants are *Ceratophyllum* sps., *Myriophyllum* sps., extent of emergent plants., *Nelumba* sps., *Nymphaea* sps. The extent of other plants and planktons presence (Algae, zooplankton) habitat features are Stony margins, Wood debris around margins, Muddy margins., Areas of emergent vegetation, Plant debris and Others. The Physical factors are considered important

from the habitat of the leech *A. birmanica*. Size of water body (area in M²), The Fauna and water quality are noticed like PH, Conductivity, Dissolved Oxygen, Temperature, Turbidity, Water color, Signs of pollution, Sediments/Pond base are examined for the occurrence of the leech species from the both study areas are given in the subsequent tables, 1–10. The pond bottom is an important factor for the hibernation, aestivation, resting for the leech species. Therefore, this factor was also considered as an important aspect for habitat study.

The leeches in fresh water habitat are lesser in population Density (Sawyer, 1984, Trontelj 2000). Due to lack of vegetation and availability of food, especially the Sanguivorous leech Sp. *Asiaticobdella birmanica* get its host in the shallow and deep water too. The domestic Buffalo enter into deep water up to the depth of 5 ft to 6 ft. by their own or forcefully directed to enter in to the deep water of stream (Stagnant pools) by the cow boy. Though there is report on the fact that the sandy and muddy substrate cause to restrict the distribution of leech in fresh water habitat, but in most of the habitats surveyed for the occurrence of leech species, there is vegetation in the form of weed species mainly marginal *Ipomoea sp* and interiorly invading *Typha* having a thick network of underwater stem and root system favors the distribution of *Asiaticobdella birmanica* in the study area.

In absence of host buffalo, in the deeper water up to 5–6 ft. depth, it was practically difficult to check the occurrence due to heavy deposition of silt. (up to 3–4 ft. thick layer on bottom). Hence due to safety reason that the leech collector may get buried into the silty bottom the leech collection trials were not carried from the deeper area of stagnant pools within the polluted stream (Chavan et al., 2011).

***Asiaticobdella birmanica* Leech Survey Habitat: Lendi & Galanti Streams at Palam**

Table 1: Geographical Location

Map Ref. No.	PBN/LSP, MAP 06	Date	18 Aug.2011
Site Name	Lendi Stream	Time	1Hr.
Location	Palam to west direction of Palam town	Season	Monsoon
		Weather	Moist with little humidity
Taluka	Palam		-
Site Name	Galati Stream	Time	1 Hr.
Location	Sirpur	Season	Monsoon
		Weather	Moist with humidity
Taluka	Palam		

Table 2: Site Description

Site Description	0–10 M %	10–50 M %	50–200 M %	Site Description	0–10 M %	10–50 M %	50–200 M %
Lendi Stream							
Woodland on the coast	05%	-	-	Mountain	5%	-	-
Xerophytes Woodland	—	20%	—	Upland	-	20%	-

Low land raised bog	—	23%	—	Limestone pavement	10%	-	-
Grazing Marsh	—	—	87%	Urbal (Hard surface)	05%	-	-
Fen, Swamp, Marsh	-	-	No swamp	Other (Agri. crop plants) around/along	-	40	-
Galati Stream							
Woodland on the coast	05	-	-	Mountain	00	-	-
XerophytesWoodland	-	27	-	Upland	-	25	-
Low land raised bog	-	25	-	Limestone pavement	09	-	-
Grazing marsh	-	-	80	Urbal (Hard surface)	-	-	-
Fen, Swamp, Marsh	-	-	-	Other	-	-	-

Table 3: Vegetation in and Around Water Body

	None	1–20%	21–40%	41–60%	61–80%	81–100%	Main tress/Shrubs over hanging
Lendi Stream							
Over shading of margin	-	-	-	50	-	-	<i>Acasia vediana</i>
Over shading of water body	-	15	-	-	-	-	<i>Acasia vediana</i>
Extent of Submerged aquatic plants	-	-	35	-	-	-	<i>Typha species</i>
Extent emergent plants	-	-	-	-	-	-	Not existing
Extent of marginal plants	-	-	25	-	-	-	<i>Ipomoea</i> sp.
Extent of other plants	-	-	22	-	-	-	<i>Hydrilla</i> sp. and some unidentified weed some extent
Galati Stream							
Over shading of margin	-	-	40	-	-	-	<i>Acasia vediana</i>
Over shading of water body	-	10	-	-	-	-	<i>Acasia vediana</i>
Extent of Submerged aquatic plants	-	-	25	-	-	-	<i>Typha</i> sp.
Extent emergent plants	-	-	22	-	-	-	<i>Typha</i> sp.
Extent of marginal plants	-	20	-	-	-	-	<i>Ipomoea</i> . sp.
Extent of other plants	-	-	25	-	-	-	<i>Hydrophyte</i> sp. (not identified) miscellaneous

Table 4: Habitat Features

	Presence	Abundance (Approx%)	Note
Lendi Stream			
Stony margins	-	-	None
Wood dabirs around margins	-	-	None
Muddy margins	Yes	30	Muddy patches due to black soil
Bird nests eg. Water fowl, duck	-	-	Not existing
Area of Reed/emergent veg.	Yes	5–10	<i>Ipomoea, Thypha/species</i>
Plant debris strand line	-	-	Not existing
Other	-	-	During non monsoon it get dried
Galati Stream			
Stony margins	-	-	-
Wood dabirs around margins	-	-	-
Muddy margins	Yes	75%	Muddy patches due to presence of Black loomy soil
Bird nests eg. Water fowl, duck	Yes	3–4%	Water fowl
Area of Reed/emergent veg.	Yes	5–7%	<i>Ipomoea, Typha</i> & other weeds
Plant debris strand line	-	-	<i>Acasis vediana</i>
Other	-	-	Usually dry up

Table 5: Adjacent Water Bodies

	0–10 M No.	Connected/Temp, Perm/Not	10–50 M No.	Connected/Temp, Perm/Not	50–200 M No.	Connected/Temp, Perm/Not
Lendi Stream						
Other Ponds	-	Not Connected	-	Not Connected	-	Not Connected
Lakes	-	Not Connected	-	Not Connected	-	Not Connected
Gravel pits	-	Not Connected	-	Not Connected	-	Not Connected
Ditches	-	Not Connected	3 m	Not Connected	-	Not Connected
Streams	-	Not Connected	-	Not Connected	-	Not Connected
Rivers	-	Not Connected	-	Not Connected	-	Connected to Godavari
Galati Stream						
Other Ponds	-	Not Connected	Not	Not Connected	-	Not Connected
Lakes	-	Not Connected	Not	Not Connected	-	Not Connected
Gravel pits	-	Not Connected	Not	Not Connected	-	Not Connected

Ditches	-	Not Connected	30	Not Connected	-	Not Connected
Streams	10	Permanent	5	Temporary	5	Temporary
Rivers	1	Permanent	50	Connected	-	Not Connected

Table 6: Physical Factors

	Max	Min	Avg	Notes
Lendi Stream				
Size of water body (area m ²) exist within stream	8	4	6	Stream get entirely dried during summer, during monsoon only it flow and there is water in the small ponds developed within the stream
Depth of water body in centre (m)	4	2	3	
Depth of water body at margins (m)	3	2	2.5	
Galati Stream				
Size of water body (area in m ²)	15	7	9	There are temporary, seasonal water bodies, nearly 07 months 90 per cent part remain dry
Depth of water body in centre (m)	4	1	2	
Depth of water body at margins (m)	-	-	-	

Lendi Stream					
Permanent water body	No	Semi-permanent water body	Yes	True Ephemeral water body	No
Galati Stream					
Permanent water body		Semi-permanent water body	Yes	True Ephemeral water body	-

Lendi Stream				
	0–15°	15–30°	30–45°	45–90°
Bank steepness/gradient (% of pond)	12–13°	-	-	-
Galati Stream				
	0–15°	15–30°	30–45°	45–90°
Bank steepness/gradient (% of pond)	-	17°	-	-

Table 7: Water Quality

Parameter	Maximum	Minimum	Average	When Taken
Lendi Stream				
pH	8	6	7	Monsoon
Conductivity	-	-	-	-
Dissolved O ₂ (mg/lit)	4.0	1.0	3.0	Morning
Temperature	25	21	23	Monsoon, winter, summer
Galati Stream				
pH	8	6	7	Monsoon
Conductivity	-	-	-	-
Dissolved O ₂ (mg/lit)	07	05	6.0	Monsoon
Temperature	26	20	23	Monsoon, Winter, Summer

Lendi Stream				
Turbidity	Clear			All season
Water Color	Normal			
Signs of Pollution	Near the Palam town it is polluted, at other places non polluted			
Sedimentation base		Small amount	Medium amount	Large amount
	Whole leave /twigs	✓	-	-
	Decomposed leaves/twigs	✓	-	-
	Organic debris < 5 mm	✓	-	-
	Organic & inorganic debris <1 mm	✓	-	-
	Gravel	-	✓	-
	Sand	-	✓	-
	Clay	-	-	-
	Rock	✓	-	-
	Other	-	-	-

Galati Stream				
Turbidity	Normal, flowing clear	5–6%	-	All season
Water Colour	clear, very less or no sewage load inside			
Signs of Pollution	At some places floating algae masses seen is isolated ponds during late winter in the stream.			
Sediments Pond base		Small amount	Medium amount	Large amount
	Whole leave /twigs	✓	-	-
	Decomposed leaves /twigs	✓	-	-
	Organic debris < 5 mm	✓	-	-
	Organic & inorganic debris < 1 mm	✓	-	-
	Gravel	-	✓	
	Sand	-	✓	-
	Clay	-	✓	-
	Rock	-	✓	-
	Other	-	-	Large stones

Table 8: Fauna

Fauna	Average % Abundance of Sampling in a Year	Which Species
Lendi Stream		
Fish	10%	Catla, Rohu Mrigal.
Amphibians	2–3%	Water snakes, Rana trigina,
Birds	6–7%	Water fawls, Heron, crow, Ibis sp.

Other Leech species	20%	<i>Pisciobdella granulessa</i> , <i>P. manilensis</i>
Other Invertebrates	9%	Mollscus, Pila, Unio, Snail
Livestock	60%	Buffalo (<i>Bubalus bubalus</i>).
Galati Stream		
Fish	20%	Catla, Rohu, Mrigala.
Amphibians	7–8%	<i>Rana tigrina</i>
Birds	5–6%	Water fowls, heron Pigeons
Other Leech species	5–7%	<i>P. viridis</i> , <i>P. manilensis</i>
Other Invertebrates	15%	Pila, Unio, mollusks
Livestock	80%	Buffalo (<i>Bubalus bubalus</i>)

Table 9: Site Management and Use

Comments on current/historical management of site	Comments on amenity/public recreational use of site (e.g. water sports, Buffalo Cleaning, Cattle drinking water source walking, fishing etc.)
Lendi Stream	
It is rain water fed stream carrying water from different villages. The stream catchment area is near Puieny, Palam, Kerwadi, Ghoda, Jwala, Gulkhand, Wadi etc. villages.	These source are used for Buffalo Cleaning, Cattle drinking water source, Source of agriculture for semi dry irrigation, Bricks manufacturing, fishing
Galati Stream	
It is seasonal stream	Seasonally used for cattle drinking source, seasonally used for agriculture and for brick manufacturing

Leech, *Asiaticobdella birmanica* present at both sites habitat, Lendi stream and Galati stream in Palam. In both of these streams, the leech sp. *A. birmanica* search was initially carried out, earlier no any record for both streams for leech survey.

To carry out splash sampling for ten minutes at each of Lendi stream and Galati stream eight and seven suitable locations around the margin of the water body is done respectively. The number and sizes of leeches recorded during each of these sampling periods.

Table 10: Standard Splash Sample for Leeches

Sl. No.	Microhabitat Description	Time Spent (min)	Total no. of Individuals	No. In size class (Average extended body Length in cm.)						No. of Gravid Individuals
				<2	2-4	4-6	6-8	8-10	>10	
Lendi Stream										
1	Stream near Mutkhed	10	-	-	-	-	-	-	-	-
2	Stream pond near Sadlapur	10	5	01	-	02	-	02	-	-
3	Pond near Gangakhed road bridge	10	7	-	03	01	02	-	01	-
4	Pond near palam	10	9	02	04	-	01	02	-	-
5	Pond near Fala road	10	15	01	05	04	-	-	02	03
6	Pond near Farkhanda Road	10	-	-	-	-	-	-	-	-
7	Pond near village Jwala	10	20	05	02	07	-	-	03	-
8	Pond near village Gulkhand	10	-	02	09	03	-	02	-	04
Galati Stream										
1	Isolated pond near Arkhed	10	5	1	1	-	2	1	-	-
2	Pond near Ghoda	10	7	3	2	-	1	1	-	-
3	Isolated pond near Sirpur	10	2	1	1	-	0	0	-	-
4	Isolated pond near Sayala	10	4	1	2	-	1	0	-	-
5	Isolated pond near Maradasgaon	10	7	4	1	-	1	1	-	-
6	Pond near Gangakhed road	10	4	1	1	-	0	2	-	-
7	Isolated pond near Ravrajura	10	2	0	1	-	1	0	-	-

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